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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VINH, LAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,452

Applicant(s)

HONGO ET AL.

Examiner

Lan Vinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/572432.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh (US 6,056,869) in view of Chen (US 5,723,387)

Uzoh discloses a method for electrochemically deplating metal from side edges of a semiconductor wafer. The method comprises the steps of:

depositing/plating a metal film 17 onto a surface of seed layer 5 of a substrate (col 4, lines 4-6; fig. 2b)

in a shaped cathode/cleaning section, ejecting an etching solution from one opening 99 on the arm 25, the opening 99 is located slightly above portion 15 of the metal film 17 (fig. 3d), only onto the side edge/peripheral portion 11 of the metal film for removing side edge portion 11 of the metal film while holding and rotating the wafer/substrate (col 7, lines 62-65; col 8, lines 49-56,). Fig. 3d of Uzoh shows that the edge/peripheral portion of the metal layer 11 facing upwardly

Unlike the instant claimed inventions as per claims 1, 6, Uzoh fails to specifically disclose plating the metal film in a plating section/plating vessel

Chen discloses a method for forming copper interconnection comprises the step of plating the metal film in a plating section/plating vessel (col 5, lines 23-25)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh by plating the metal film in a plating section/plating vessel as per Chen because according to Chen plating the metal film in a plating section provides a thick layer of Cu in a less stringent clean environment (col 6, lines 65-67)

Regarding claim 2, Uzoh discloses directing the electrolyte/cleaning onto a backside of the wafer/substrate in the shaped cathode/cleaning solution for removing metal adhered to the backside (col 8, lines 54-56; fig. 3b)

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Regarding claim 3, fig. 3a of Uzoh shows that the electrolyte/ cleaning solution is supplied onto a central portion of the substrate for removing metal from the substrate

Regarding claim 4, Uzoh discloses that one or more electrolytes/cleaning solution and/or etchant may be directed onto the side edge and central portion of the substrate having the metal film (col 6, lines 12-21; fig. 3a0

Regarding claim 5, Uzoh discloses that the unwanted metal on the backside is entirely removed by the electroyte/cleaning solution (col 8, lines 49-56)

Regarding claims 7-8, Uzoh discloses using a nozzle inclined to a surface of the metal film to eject the electrolyte onto the side edge of the metal film (col 8, lines 14-16, fig. 3b shows the nozzle is spaced a distance from the edge of the substrate

Regarding claim 9, Uzoh discloses using sulfuric acid in the electrolyte/etchant solution (col 6, lines 23-25)

Regarding claim 10, Uzoh discloses forming Cu film on the substrate (col 4, lines 1-2)

Regarding claim 11, Uzoh discloses flowing DI water through conduit 35 onto the surface of the substrate (col 5, lines 55-65), which reads on washing the metal film plated on the substrate before ejecting the etching solution onto the peripheral of the metal film

Unlike the instant claimed inventions as per claim 12, Uzoh fails to specifically disclose rinsing and drying the substrate after ejecting the etching solution onto the substrate

Chen also discloses rinsing and drying the substrate after cleaning the substrate with an etching solution (col 3, lines 50-57)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh by adding the step of rinsing and drying the substrate after ejecting the etching solution onto the substrate to prepare the substrate for re-introduction into the very clean environment as taught by Chen (col 3, lines 56-58)

Unlike the instant claimed inventions as per claim 13, Uzoh fails to specifically disclose transporting the substrate from the plating section to the cleaning section

Chen also discloses transporting the substrate from the plating section to the cleaning section using automated indexing apparatus (col 5, lines 17-20)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh method by adding the step of transporting the substrate from the plating section to the cleaning section using indexing apparatus for withdrawal of substrate from the chamber for further processing in associated semiconductor manufacturing apparatus that require high clean room environment as taught by Chen (col 6, lines 20-27)

Response to Arguments

3. Applicant's arguments filed 8/3/2005 have been fully considered but they are not persuasive

Applicants argue that in Uzoh, neither metal 11 or metal 15 faces upwardly thus the portions onto which the etching solution is applied do not face upwardly during rotation of the wafer. This argument is unpersuasive because as seen in fig. 3d of Uzoh, the edge/peripheral portion of the metal layer 11 onto which the etching solution (from

opening 99) is applied facing upwardly. Applicants further argue that the etching solution in Uzoh does not flow via centrifugal force, and accordingly, a sharp boundary can not be obtained. This argument is unpersuasive because it does not commensurate with the scope of claim 1 since claim 1 does not specifically require/recite that the etching solution flows via centrifugal force, and accordingly, a sharp boundary can be obtained.

It is argued that Uzoh and Chen lack the feature of ejecting the etching solution from above the metal film. This argument is unpersuasive because as shown in fig. 3d of Uzoh, the etching solution 101 is ejected from an opening 99 located slightly above the metal film 15, the metal film 15 is formed on a surface of seed layer 5 (fig. 2b), as required in claim 1. Thus, it is asserted that Uzoh discloses the claimed feature of ejecting the etching solution from above the metal film.

4. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV
October 6, 2005